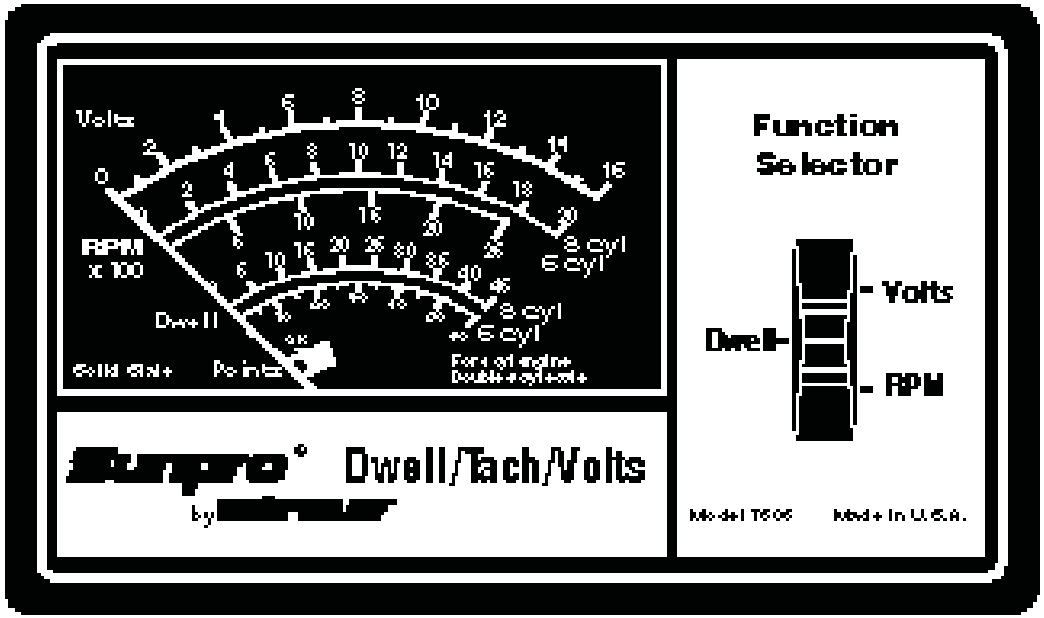
Sunpro® by actron®

CP7605

actron®

OPERATING INSTRUCTIONS



Dwell/Tach/Voltmeter

FOR 12 VOLT ELECTRONIC OR CONVENTIONAL IGNITION SYSTEMS

- OPERATING INSTRUCTIONS
- SAFETY RULES
- TUNE-UP PROCEDURES
- REPAIR PARTS

SAFETY GUIDELINES

TO PREVENT ACCIDENTS THAT COULD RESULT IN SERIOUS INJURY AND/OR DAMAGE TO YOUR VEHICLE OR TEST EQUIPMENT, CAREFULLY FOLLOW THESE SAFETY RULES AND TEST PROCEDURES

SAFETY EQUIPMENT

Fire Extinguisher

Never work on your car without having a suitable fire extinguisher handy. A 5-lb or larger CO_2 or dry chemical unit specified for gasoline/chemical/electrical fires is recommended.

Fireproof Container

Rags and flammable liquids should be stored only in fireproof, closed metal containers. A gasoline-soaked rag should be allowed to dry thoroughly outdoors before being discarded.

Safety Goggles

We recommend wearing safety goggles when working on your car, to protect your eyes from battery acid, gasoline, and dust and dirt flying off moving engine parts.

NOTE: Never look directly into the carburetor throat while the engine is cranking or running, as sudden backfire can cause burns.

LOOSE CLOTHING AND LONG HAIR (MOVING PARTS)

Be very careful not to get your hands, hair or clothes near any moving parts such as fan blades, belts and pulleys or throttle and transmission linkages. Never wear neckties or loose clothing when working on your car.

JEWELRY

Never wear wrist watches, rings or other jewelry when working on your car. You'll avoid the possibility of catching on moving parts or causing an electrical short circuit which could shock or burn you.

VENTILATION

The carbon monoxide in exhaust gas is highly toxic. To avoid asphyxiation, always operate vehicle in a well-ventilated area. If vehicle is in an enclosed area, exhaust should be routed directly to the outside via leakproof exhaust hose.

SETTING THE BRAKE

Make sure that your car is in Park or Neutral, and that the parking brake is firmly set.

NOTE: Some vehicles have an automatic release on the parking brake when the gear shift lever is removed from the PARK position. This feature must be disabled when it is necessary (for testing) to have the parking brake engaged when in the DRIVE position. Refer to your vehicle service manual for more information.

HOT SURFACES

Avoid contact with hot surfaces such as exhaust manifolds and pipes, mufflers (catalytic converters), radiator and hoses. Never remove the radiator cap while the engine is hot, as escaping coolant under pressure may seriously burn you.

SMOKING AND OPEN FLAMES

Never smoke while working on your car. Gasoline vapor is highly flammable, and the gas formed in a charging battery is explosive.

BATTERY

Do not lay tools or equipment on the battery. Accidentally grounding the "HOT" battery terminal can shock or burn you and damage wiring, the battery or your tools and testers. Be careful of contact with battery acid. It can burn holes in your clothing and burn your skin or eyes.

When operating any test instrument from an auxiliary battery, connect a jumper wire between the negative terminal of the auxiliary battery and ground on the vehicle under test. When working in a garage or other enclosed area, auxiliary battery should be located at least 18 inches above the floor to minimize the possibility of igniting gasoline vapors

HIGH VOLTAGE

High voltage — 30,000 to 50,000 volts — is present in the ignition coil, distributor cap, ignition wires and spark plugs. When handling ignition wires while the engine is running, use insulated pliers to avoid a shock. While not lethal, a shock may cause you to jerk involuntarily and hurt yourself.

JACK

The jack supplied with the vehicle should be used only for changing wheels. Never crawl under car or run engine while vehicle is on a jack.

IMPORTANT

THIS MANUAL PRESENTS COMPLETE HOOKUP INSTRUCTIONS FOR THE DWELL/TACH/VOLTMETER, IT ALSO DESCRIBES MANY OF THE TESTS THAT THIS INSTRUMENT IS CAPABLE OF PERFORMING AS WELL AS WHEN THEY SHOULD BE USED BASED ON VEHICLE PERFORMANCE, TUNE-UP OR TROUBLE ENCOUNTERED. CONSULT YOUR VEHICLE SERVICE MANUAL FOR SPECIFIC TUNE-UP INFORMATION AND TEST PROCEDURES. ALWAYS FOLLOW THE MANUFACTURER'S SPECIFICATIONS AND TEST PROCEDURES FOR ADJUSTING DWELL ANGLE AND IDLE SPEED, ESPECIALLY ON VEHICLES WITH MODERN ELECTRONIC IGNITION AND EMISSION CONTROLS. DO NOT ATTEMPT TO SERVICE A VEHICLE WITHOUT THE MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS.

FUNCTIONS, CONNECTIONS AND ACCESSORIES

DESCRIPTION

The Model CP7605 Dwell/Tach/Voltmeter has a clearly labeled function switch and meter as shown in the Master Hookup diagram, Figure 1 below.

1. METER
This meter displays the following scales:
   - Volts 0-16
   - RPM 0-2000 (8 cylinder)
     0-4000(4cylinder – multiply 8 cylinder scale by 2)
   - RPM 0-2500 (6 cylinder)
   - Dwell 0-45 degrees (8 cylinder)
     0-90 degrees (4 cylinder– multiply 8 cylinder by 2)
   - Dwell 0-60 degrees (6 cylinder)
   - Points OK/Defective

2. FUNCTION SELECTOR
This selects the RPM, Dwell, or Volts functions of the instrument.

3. TEST LEAD
Hook this lead to the proper test point in the vehicle to perform tests as required and as described below:

VOLTAGE MEASUREMENTS

GREEN CLIP – Connect to the Positive (+) voltage source to be measured. (+ Battery terminal, alternator output terminal, lamp socket, etc.).

BLACK CLIP – Vehicle ground.

CAUTION!

Avoid connecting the BLACK CLIP to the negative(-) battery terminal or any fuel system components in the event that glasses are present which could explode from sparking connections.

DWELL/TACH/BREAKER POINT RESISTANCE MEASUREMENT

GREEN CLIP – Connect to the Tach or negative (-) ignition coil terminal. See Figures 3 through 10 for specific applications

BLACK CLIP – Vehicle Ground. See CAUTION under voltage measurements.

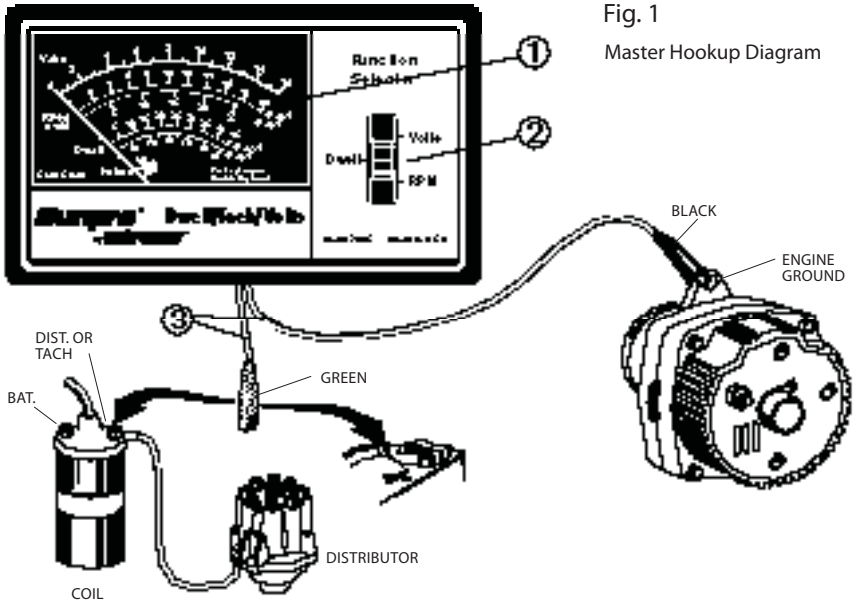


Fig. 1
Master Hookup Diagram

ACCESSORIES

See Figure 2.

1. GM DIAGNOSTIC ADAPTOR
The GM Diagnostic Adaptor is used to make connection to vehicle equipped with the GM Diagnostic Connector, (1976 – 1982). It is also used to make connection to Toyota vehicles which use the IIA (Integrated Ignition Assembly). See Figures 9 and 10 for adaptor application.

2. GM HEI ADAPTOR
The GM HEI Adaptor is used to provide connection to the "TACH" terminal on GM HEI systems. See Figure 7 for typical installation.

3. FORD COIL CLIP
The Ford Coil Clip is used for ignition systems which have booted ignition coil connections. See Figure 4 for clip application.

ELECTRICAL SYSTEM TESTS – "VOLTS" POSITION

Fig. 2
Accessories

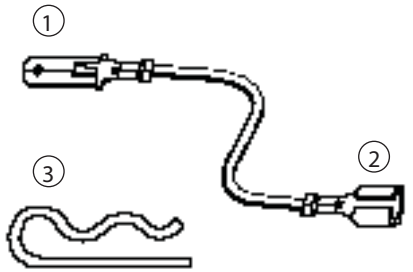
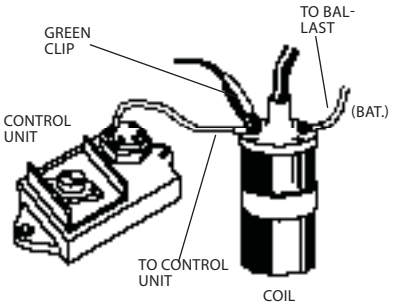
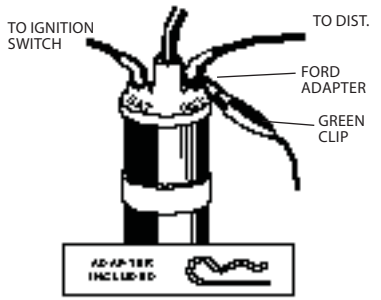


Fig. 3 Primary Tach Connection — GREEN Clip



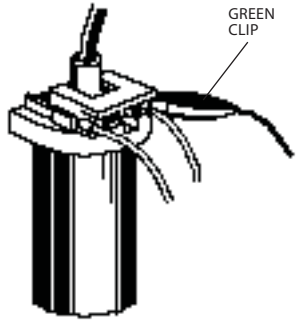
All Chrysler Corporation Electronic Ignitions, 6 & 8 cylinder shown
1972 - 1986

Fig. 4 Primary Tach/Dwell Connection – GREEN Clip



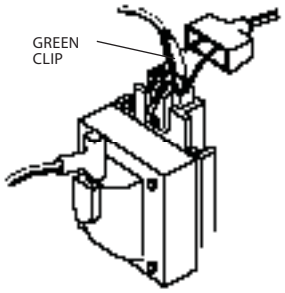
1974 Ford Electronic and All Breaker Points Ignition Systems

Fig. 5 Primary Tach Connection — GREEN Clip



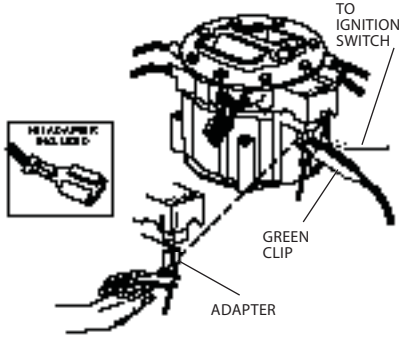
Ford Solid State & Dura Spark systems
1975 - 1986

Fig. 6 Primary Tach Connection — GREEN Clip



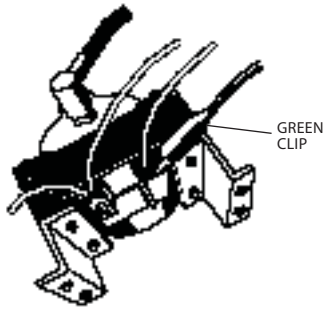
Ford TFI Systems 1981 - 1986

Fig. 7 Primary Tach Connection — GREEN Clip



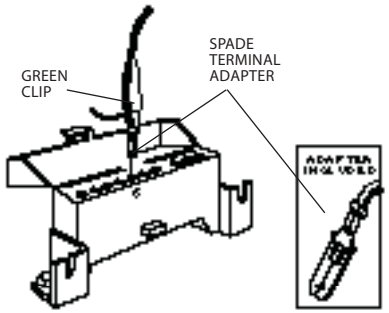
Delco HEI 1974 - 1986 Integral Coil

Fig. 8 Primary Tach Connection — GREEN Clip



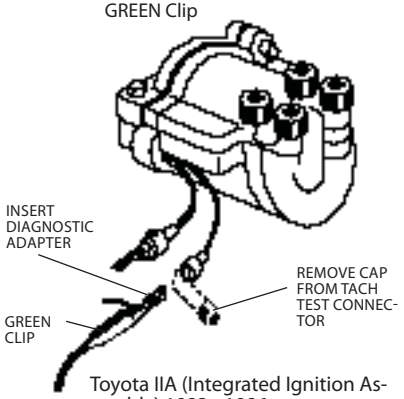
Delco HEI 1974 - 1986 External Coil

Fig. 9 Primary Tach Connection — GREEN Clip



GM Diagnostic Connector and Delco HEI Systems 1976 - 1982

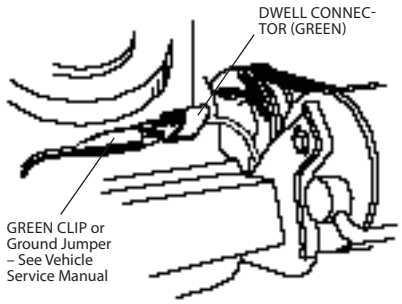
Fig. 10 Primary Tach Connection — GREEN Clip



Toyota IIA (Integrated Ignition Assembly) 1983 - 1986

Fig. 11 Performance Check ONLY

Note: This is NOT a Tach Connection point.



GM C3 (Computer Command Control)

BASIC SYSTEM CHECK – Charging Voltage

1. GREEN CLIP – Connect to the Positive (+) Battery terminal.
2. BLACK CLIP – Connect to Vehicle Ground.
3. FUNCTION SELECTOR – Volts
4. Start engine and allow it to warm up completely. Operate it at curb idle.
5. With all accessories off observe the 16 volt scale on the analyzer.
6. Normal Result – 13.2 to 15.2 volts or as specified in the vehicle service manual.
7. FUNCTION SELECTOR – RPM
8. Select a step on the fast idle cam which will maintain engine speed between l800 and 2000 RPM (or have an assistant hold engine speed in this range) through Step 12.
9. FUNCTION SELECTOR – Volts
10. Observe the 16 volt scale on the analyzer. The voltage should not have changed from Step 6 more than about .5 volts.
11. Load the electrical system by turning on the lights, Hi fan, and wipers.
12. Observe the 16 volt scale on the analyzer. The voltage should not drop below about 13.0 volts.
13. Shut off all accessories, return the engine to curb idle, and shut it off. If the results obtained in Step 6, 10 or 12 are significantly different from those shown or from the vehicle service manual values, further diagnosis is required: see your vehicle service manual.

CRANKING VOLTAGE AND BATTERY CONDITION

If the engine cranks slowly or not at all, the battery, cranking motor, and associated wiring may be at fault. Check the cranking voltage as indicated below.

1. Connect the analyzer to the vehicle battery as shown in Figure 1.
2. Disable the engine from starting as shown in Figure 12 or as explained in your vehicle service manual
3. FUNCTION SELECTOR – Volts
4. Crank the engine while observing the 16 volt scale on the analyzer.
5. Normal Result – 9.6 volts or more at 70°F. Voltage will drop slightly as temperature decreases.
6. If the results are significantly out of specification consult your vehicle service manual for further diagnosis.
7. If battery voltage remains abnormally high (above approximately 10.5 volts) on a slow or no cranking engine, the problem may be loose or corroded connection(s) in the cranking circuit.

MISCELLANEOUS VOLTAGE TESTS

This instrument can perform many of the voltage tests called out in the vehicle service manual, such as voltages at lamp sockets, motors, solenoids and relays.

NOTE: The voltmeter function of this instrument can be used anywhere the vehicle service manual calls for voltage measurement except in those applications which call for 10 Megohm input impedance or a digital voltmeter.

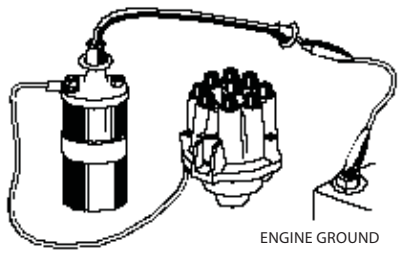
IGNITION SYSTEM TEST – "VOLTS" POSITION

BREAKER POINT RESISTANCE TEST (Breaker Point Systems Only)

1. Visually check the breaker points and associated wiring and connections. Check to see that the lead from the distributor to the Negative (-) terminal of the ignition coil is not damaged (nicked insulation, etc.)
2. Remove the distributor cap and inspect the breaker points. Properly adjusted breaker points become light gray in color in normal use. If they are blued, blackened or pitted, they have exceeded their normal life.
3. To prevent the engine from starting, disable the ignition system by grounding the coil tower wire as shown in Figure 12.
4. Connect the GREEN and BLACK clips as de-

Fig. 12 Disabling Procedure

Breaker Point Ignition System



scribed under DWELL/TACH/BREAKER POINT RESISTANCE MEASUREMENTS

NOTE: When testing a vehicle with dual points, alternately block one set of points open with a piece of insulating material while the other set is being tested.

5. Turn the ignition key ON. If the meter reads voltage, (12.5 - 13.0) the points are OPEN. Crank the engine a fraction of a revolution at a time until the meter reads in the left hand area of the scale.

   The points are now closed.

Test Results:

Normal – Meter reads in the OK zone of the Points scale. The Analyzer may indicate high point resistance on a new set of points until they have been run in the vehicle for a few miles and have been properly seated. This condition may be ignored as long as any defects discovered during the previous visual check have been corrected.

Abnormal – If the meter indicates in the Bad zone when the points are closed, the points may be defective or the following faults may exist:

Poor distributor ground

Poor connection on the primary lead from the distributor to the ignition coil

Defective distributor pigtail lead

Misaligned points

Poor points/plate ground inside distributor

Correct the defect and repeat the test.

IGNITION SYSTEM TEST – "DWELL" POSITION

DWELL TEST AND ADJUSTMENT – Breaker Point Systems Only or Transistorized Systems which Use Breaker Points.

1. Preparation:

   Before performing the DWELL TEST AND ADJUSTMENT PROCEDURE, read the vehicle emission control label or the vehicle service manual to determine what should be done with the vacuum hoses connected to the distributor and the various advance/retard solenoids. Most often, the vacuum hose must be disconnected from the distributor and the end plugged with a plastic golf "tee" or other plug.

   Connect the GREEN and BLACK clips as described under TACH/DWELL/BREAKER POINT RESISTANCE MEASUREMENTS.

2. Test Procedure:

   Start the engine and allow it to warm up (upper radiator hose hot.)

   Operate the engine at curb idle OR the RPM specified by the vehicle emission control label or the vehicle service manual for measuring dwell.

   Check the RPM by switching the FUNCTION SELECTOR TO RPM and reading the appropriate meter scale. Return the FUNCTION SELECTOR to DWELL and observe the correct dwell scale

NOTE: There is a direct relationship between dwell and timing. However, it is only a one way relationship. If you change the dwell angle of the breaker points, you will automatically change the ignition timing. Changing the timing, though, has no effect on the dwell angle. FOR THIS REASON, IT IS IMPORTANT TO RE-CHECK THE TIMING WHEN EVER THE DWELL ANGLE HAS BEEN ADJUSTED.

DWELL ADJUSTMENT – Conventional Breaker Point Systems

On GM distributors with a small metal slide cover, lift the cover and insert a l/8" Allen wrench in the adjusting screw socket and adjust the dwell by turning the wrench, as shown in Figure 13.

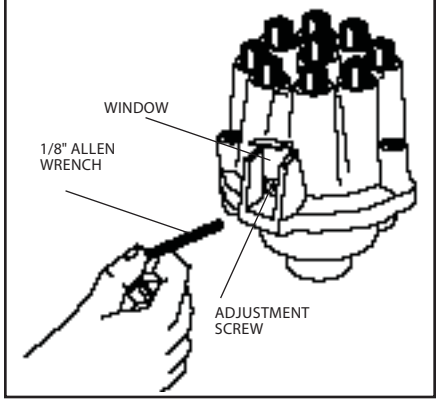
On Ford, Chrysler, American Motors, and other distributors not equipped with a small metal access slide cover, perform the following steps while referring to Figure 14.

1. Remove coil wire from center tower of distributor cap and ground the wire by connecting the loose end to the engine or frame, See Figure 12.
2. Remove the distributor cap and rotor.
3. Connect a remote starter switch to the vehicle or have an assistant crank the engine for you.
4. With ignition switch ON and engine cranking observe reading on the Dwell scale.
5. To adjust Dwell, loosen the locking screw slightly and adjust the point gap with a feeler gauge according to the procedure outlined in the vehicle service manual. After adjustment, tighten locking screw, and recheck dwell while cranking engine. Repeat procedure if necessary. (Figure 14.)
6. Reassemble distributor and recheck dwell reading with engine operating at idle speed. Repeat steps 5 and 6 if necessary.

DWELL VARIATION TEST

Read the owner's manual or engine compartment decal and follow the instructions regarding vacuum line or advance-retard solenoid connections when

Fig. 13 Typical General Motors Breaker Points Distributor



checking DWELL angle. Usually, the vacuum hose must be disconnected from the distributor and plugged

Increase the engine speed from idle to about 1500 RPM and note the dwell angle (Figure 15). Return the engine speed to idle and again note the dwell angle. If the difference between the two dwell angle readings is more than 3 degrees, check for excessive wear in the breaker point plate and couplings or excessive wear in the distributor shaft gear and bushings.

Fig. 14 Dwell Adjustment
(All, except Delco-Remy Sliding Window Distributors)

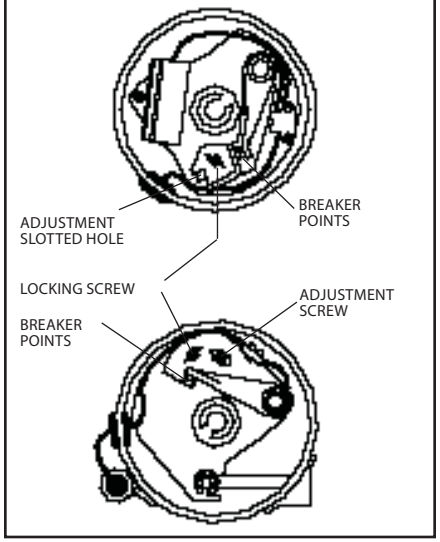
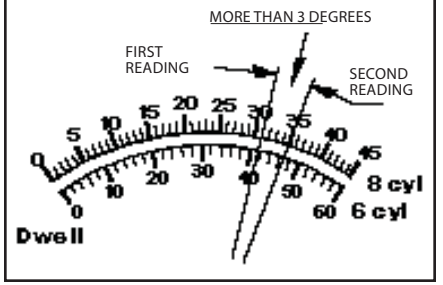


Fig. 15 Dwell Variation



FUEL SYSTEM TESTS – "DWELL" POSITION

1. General Motors C-3 (Computer Command Control) Mixture Control Solenoid Dwell (Carburetor equipped vehicles only). The GMC-3 system controls Air/Fuel ratio with a mixture control solenoid mounted in the carburetor. The basic system performance check of this system calls for the checking of the duty cycle or dwell of the M/C solenoid. Note that regardless of the number of cylinders in the vehicle, the reading is always taken from the 6 cylinder scale.
2. This analyzer may be used to check C-3 Dwell (duty cycle). Refer to your vehicle service manual for hookup instructions and performance results. See Figure 11.

ENGINE TESTS – "RPM" POSITION

1. Carburetor Adjustments – There are several adjustments which should be checked as part of a performance tune-up. Those which require engine RPM monitoring are:
   a. Curb idle
   b. Base idle
   c. Solenoid Controlled idle
   d. Fast idle

   Your vehicle will likely have some combination of these adjustments. Proper adjustment of these settings is a requirement for good engine performance and driveability.
2. Fuel Injection Adjustments – Some fuel injection systems have a minimum and maximum authority adjustment which should be checked during routine performance tune-up or whenever idle problems are encountered.
3. Miscellaneous Engine Test – Many of the test

procedures in your vehicle service manual require the engine to run at a specific RPM during the test. Your instrument provides excellent monitoring capabilities for this purpose.

Model CP7605
Replacement Parts

Key No.	Part No.	Description
1	400-857	Case, bottom
2	270-117	Screw, Case self-tap. #6-20 x 1"
3	38-726	Cable Assembly, Green and Black Clip
4	450-133	Cap, Glamour
5	180-300	Ford Adapter
6	38-1342	GM Adapter
7	1-1086	Switch Decal
8	1-1085	Meter Decal
9	400-855	Window
—	2-219301	Instruction Manual (Not shown)

NOTE: The circuit board and meter are not replacement parts since the replacement of either requires recalibration of the instrument.